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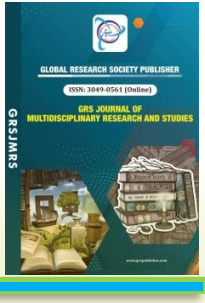

Imaging Spectrum of Uterine Fibroids: A Retrospective Study

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Abstract: Background- Uterine fibroids, also known as uterine leiomyomas, are the most common benign tumors of the female reproductive tract. They arise from the smooth muscle cells of the myometrium and are frequently encountered in women of reproductive age. Imaging plays a crucial role in their detection, characterization, and classification for guiding clinical management.

Objective- To evaluate the imaging spectrum of uterine fibroids using ultrasound and magnetic resonance imaging (MRI) and to analyze their distribution, morphology, and imaging characteristics in patients diagnosed at an Indira Gandhi Government Medical College, Nagpur.

Materials and Methods- This retrospective study included 347 patients diagnosed with uterine fibroids who underwent pelvic ultrasound and/or MRI between 2024 and 2026 at Indira Gandhi Government Medical College, Nagpur. Imaging findings were reviewed for number, location, size, and imaging characteristics. Fibroids were classified according to the FIGO classification system.

Results- Among the 347 patients included in the study, the majority belonged to the reproductive age group of 30–45 years. Intramural fibroids were the most common type identified on imaging. Ultrasound served as the primary modality for detection, while MRI provided superior delineation of fibroid location and degenerative changes.

Conclusion- Ultrasound and MRI provide complementary roles in the evaluation of uterine fibroids. Accurate imaging characterization assists in guiding clinical management and treatment planning.

Cite this Article

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Introduction

Uterine fibroids are benign monoclonal tumors originating from the smooth muscle cells of the myometrium. They are the most frequently encountered pelvic tumors in women and represent a significant cause of gynecologic morbidity. The prevalence of fibroids increases with age during the reproductive years and may affect up to 60–70% of women by the age of 50.

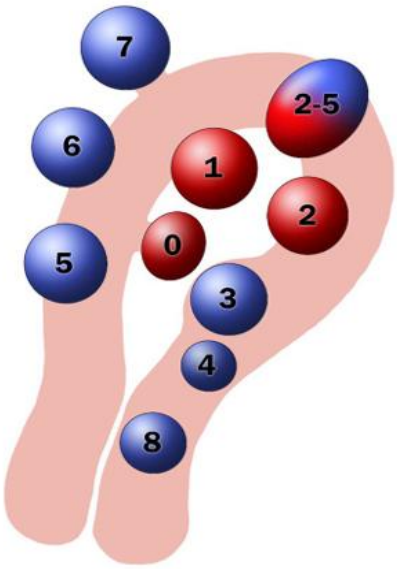
Fibroids vary greatly in number, size, and location within the uterus. They may arise within the myometrium, project into the uterine cavity, or extend outward toward the serosal surface. Depending on their location and size, fibroids may remain asymptomatic or lead to various clinical manifestations such as menorrhagia, dysmenorrhea, pelvic pain, infertility, and recurrent pregnancy loss.

Ultrasound is widely used as the first-line imaging modality because it is non-invasive, widely available, and cost-effective. On ultrasound, fibroids typically appear as well-defined hypoechoic masses with a characteristic whorled appearance and posterior acoustic shadowing.

Magnetic resonance imaging (MRI) provides superior soft tissue contrast and allows precise localization and characterization of fibroids. MRI is also useful in assessing degenerative changes within fibroids and in planning surgical or interventional procedures such as myomectomy or uterine artery embolization.

FIGO Classification of Uterine Fibroids with Ultrasound (USG) Appearance

Uterine fibroids (Leiomyomas) are benign smooth muscle tumors of the uterus commonly seen in women of reproductive age. The International Federation of Gynecology and Obstetrics (FIGO) classification categorizes fibroids according to their relationship with the endometrium, myometrium, and uterine serosal surface. Ultrasonography (USG) is the first-line imaging modality for detection and classification of uterine fibroids.

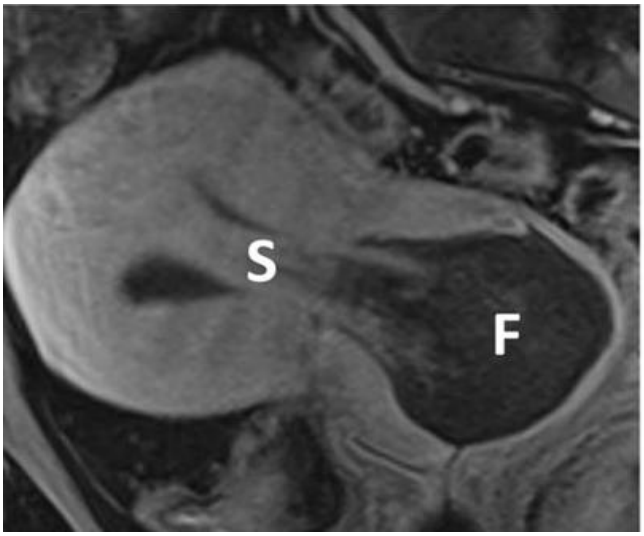


Type 0 – Pedunculated Submucosal Fibroid

Definition: Fibroid completely located within the endometrial cavity and attached to the uterine wall by a thin stalk.

USG Appearance: Well-defined hypoechoic mass within the endometrial cavity with a pedunculated vascular stalk. Uterine cavity distension and posterior acoustic shadowing may be seen.

MRI Appearance: Isointense on T1-weighted images and low signal intensity on T2-weighted images. A thin stalk connecting the fibroid to the endometrium is usually visible.

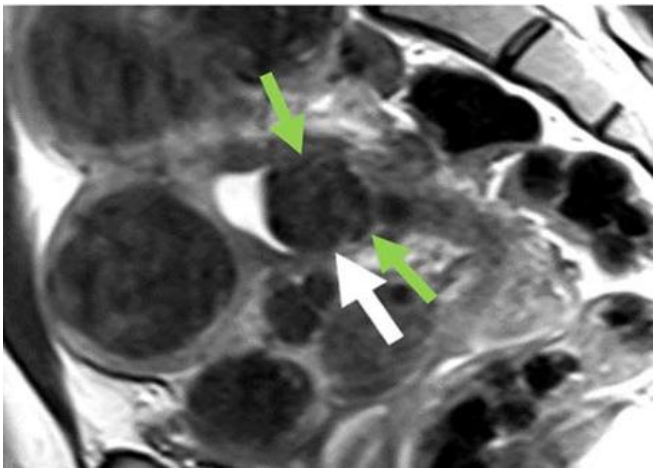


Type 1 – Submucosal Fibroid (<50% Intramural)

Definition: Fibroid protrudes into the uterine cavity with less than 50% intramural component.

USG Appearance: Hypoechoic lesion projecting into the uterine cavity with distortion of the endometrial stripe.

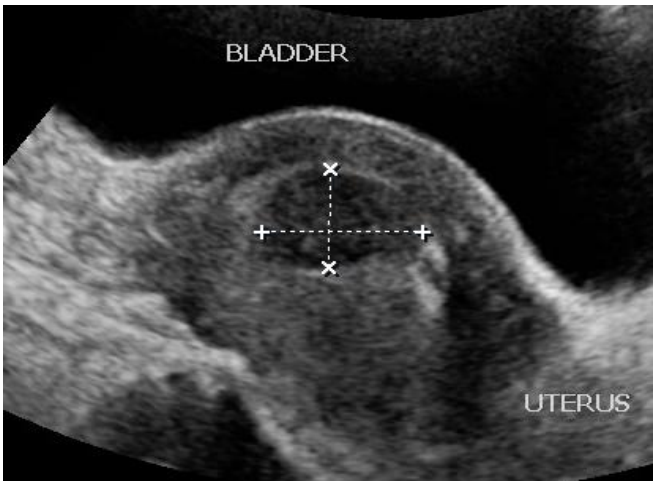
MRI Appearance: T2 hypo intense mass protruding into the endometrial cavity with less than half of the lesion embedded within the myometrium.



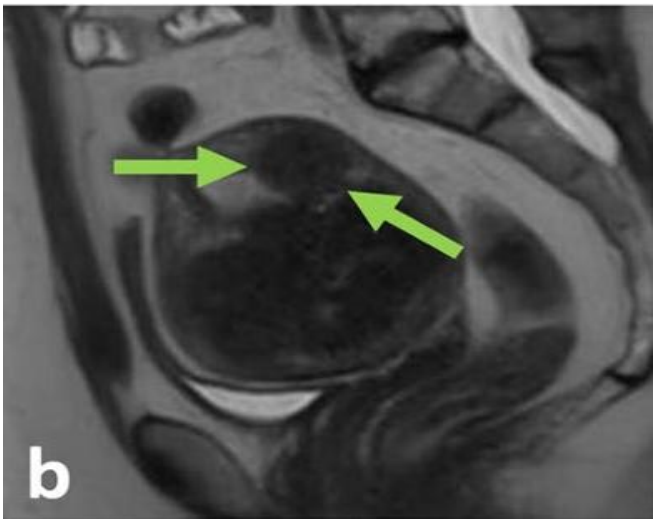
Type 2 – Submucosal Fibroid (≥50% Intramural)

Definition: Fibroid protruding into the uterine cavity with more than 50% of its volume within the myometrium.

USG Appearance: Heterogeneous hypoechoic lesion causing indentation of the endometrial cavity.



MRI Appearance: T2 hypointense intramural mass with significant intramyometrial component causing endometrial indentation.

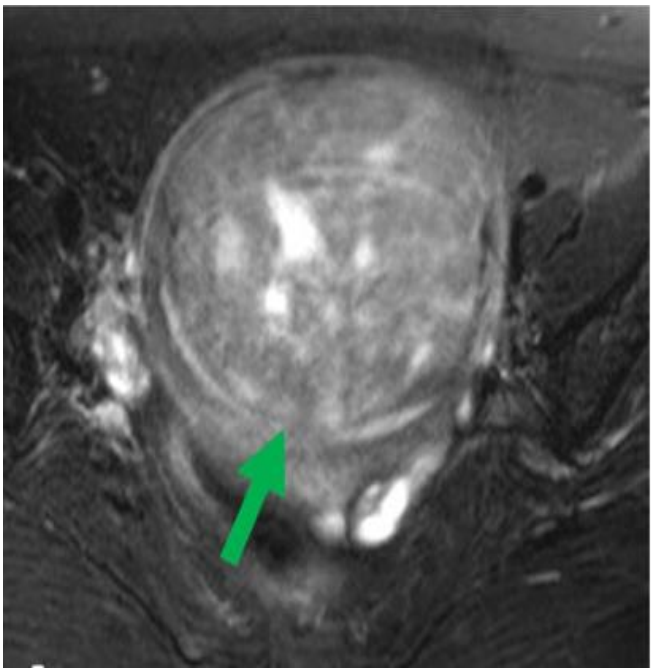


Type 3 – Intramural Fibroid Contacting Endometrium

Definition: Completely intramural fibroid that abuts the endometrium without protruding into the uterine cavity.

USG Appearance: Well-defined hypoechoic intramural lesion causing displacement of the endometrium.

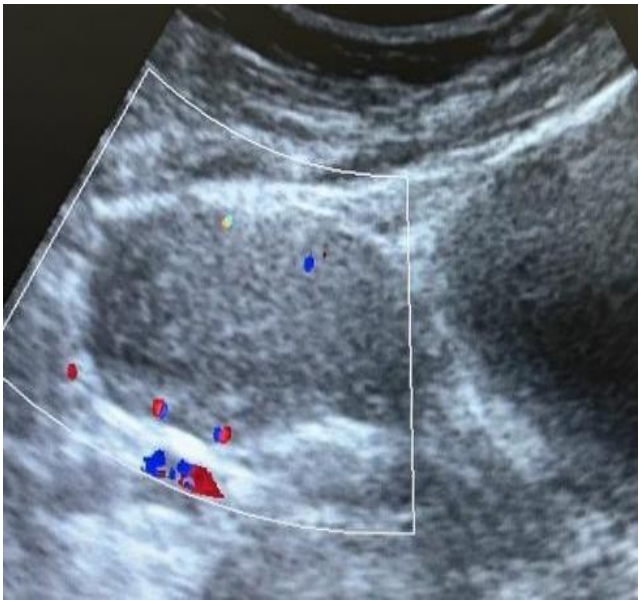
MRI Appearance: T2 hypointense intramural lesion contacting the endometrial lining without intracavitary extension.



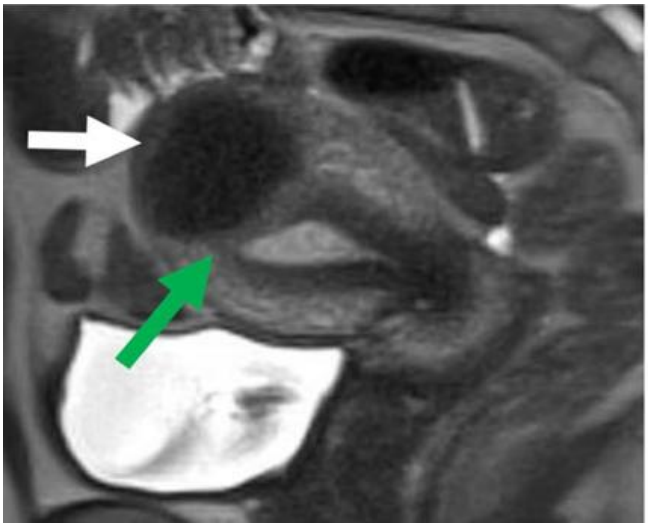
Type 4 – Intramural Fibroid

Definition: Fibroid entirely located within the myometrium without contact with the endometrium or serosa.

USG Appearance: Round hypoechoic lesion within the myometrium with posterior acoustic shadowing and whorled appearance.



MRI Appearance: Well-defined lesion with low signal intensity on T2-weighted images and isointense signal on T1-weighted images.

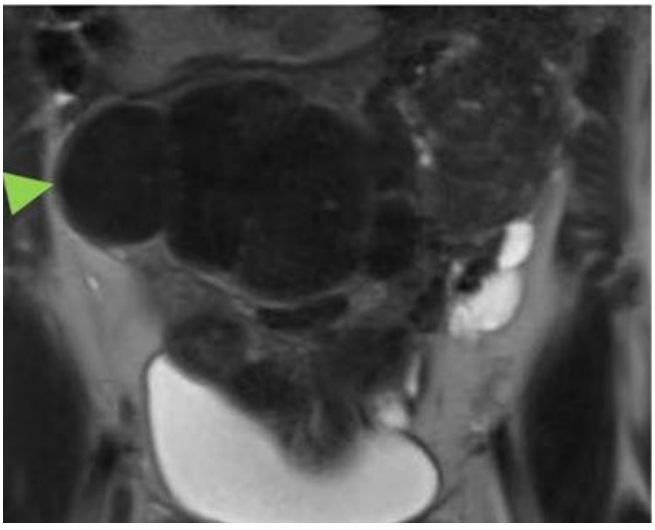


Type 5 – Sub serosal Fibroid (≥50% Intramural)

Definition: Fibroid projecting toward the serosal surface with more than half of its volume within the myometrium.

USG Appearance: Hypoechoic mass bulging from the outer uterine wall causing outward uterine contour deformity.

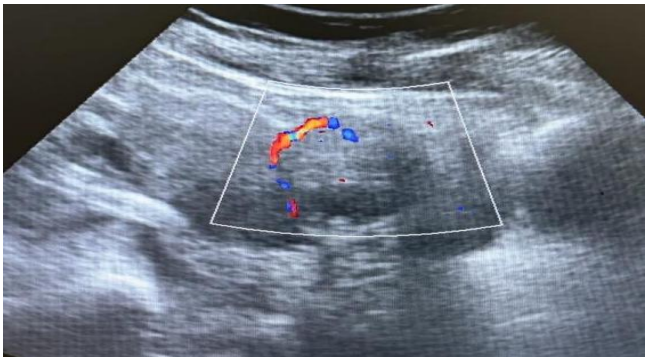
MRI Appearance: T2 hypo intense mass extending toward the serosa with majority of lesion within the myometrium.



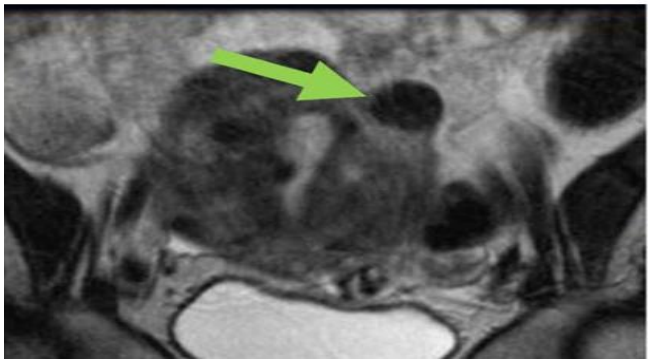
Type 6 – Subserosal Fibroid (<50% Intramural)

Definition: Fibroid predominantly located outside the uterus with less than 50% intramural component.

USG Appearance: Exophytic hypoechoic mass projecting outward from the uterus.



MRI Appearance: T2 hypointense lesion projecting outside the uterus with a narrow myometrial attachment.

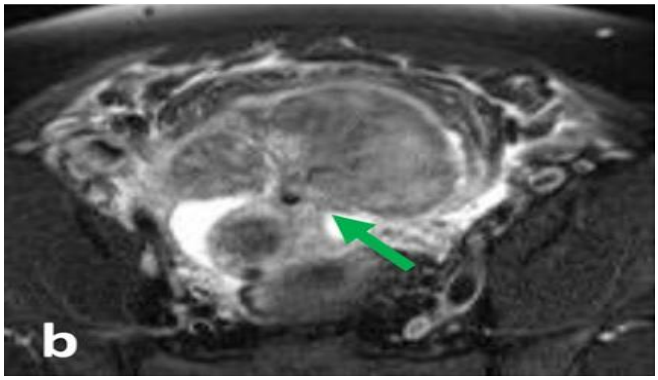


Type 7 – Pedunculated Subserosal Fibroid

Definition: Fibroid located completely outside the uterus and attached to the serosal surface by a stalk.

USG Appearance: Hypoechoic mass adjacent to the uterus connected by a thin pedicle and may mimic an adnexal mass.

MRI Appearance: Pedunculated T2 hypointense mass with a visible stalk connecting it to the uterine serosa.

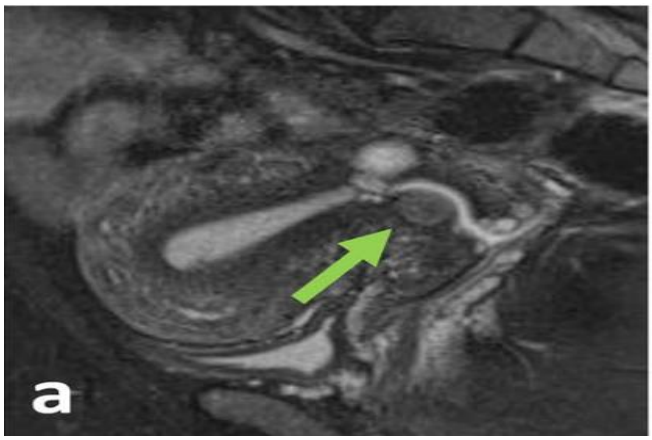


Type 8 – Other (Cervical or Parasitic Fibroids)

Definition: Fibroids located in unusual locations such as the cervix, broad ligament, or parasitic locations.

USG Appearance: Hypoechoic mass in atypical pelvic location without typical uterine contour distortion.

MRI Appearance: Well-defined T2 hypointense mass located outside the uterine body or within the cervix.



Materials and Methods

Study Design

This was a retrospective observational study conducted in the Department of Radiology at a Indira Gandhi Government Medical College, Nagpur.

Study Population

The study included 347 patients diagnosed with uterine fibroids based on imaging findings between 2024 and 2026.

Inclusion Criteria

- Female patients diagnosed with uterine fibroids on ultrasound or MRI
- Patients aged 18 years and above
- Patients with complete imaging records

Exclusion Criteria

- Patients with incomplete imaging records
- Patients with uterine malignancies
- Patients with previous hysterectomy

Ultrasound Examination

Pelvic ultrasound examinations were performed using transabdominal and transvaginal probes. Evaluation included uterine size, number of fibroids, location, echogenicity, and presence of degeneration or calcification.

MRI Examination

MRI was performed in selected patients using standard pelvic imaging protocol including T1-weighted, T2-weighted, fat suppressed, and diffusion-weighted sequences.

Imaging Analysis

All imaging studies were reviewed retrospectively. Fibroids were categorized according to the FIGO classification system based on their location relative to the endometrium and serosal surface.

Results

Demographic Distribution

Table 1: Age Distribution of Patients

Age Group (years)	Number of Patients	Percentage
20–30	33	9.5%
31–40	202	58%
41–50	98	28%
>50	14	4.5%

The majority of patients were between 30 and 45 years of age.

Clinical Presentation

Common presenting symptoms included abnormal uterine bleeding, pelvic pain, infertility, and incidental detection during routine imaging.

Table 2: Distribution of Fibroid Types

Fibroid Type	Number of Cases	Percentage
Intramural	264	76.3%

Submucosal	56	16%
Subserosal	24	6.9%
Pedunculated	3	0.8%

Intramural fibroids were the most frequently observed type.

Degenerative Changes

Degenerative changes including hyaline degeneration, cystic degeneration, red degeneration, and calcification were identified in some cases.

Discussion

Uterine fibroids represent a significant cause of gynecologic morbidity worldwide. Ultrasound remains the primary imaging modality for evaluation due to its availability and cost-effectiveness. However, MRI provides superior soft tissue contrast and allows accurate localization of fibroids.

In the present study, intramural fibroids were the most commonly encountered type. MRI was particularly useful in identifying degenerative changes and distinguishing fibroids from other uterine pathologies such as adenomyosis.

Degenerative changes may occur due to inadequate blood supply to the fibroid. Hyaline degeneration is the most common type, while cystic and red degeneration are less frequently observed.

Clinical Relevance

Accurate imaging evaluation of uterine fibroids is essential for guiding gynecologic management. Imaging findings influence treatment decisions including medical therapy, myomectomy, hysterectomy, and uterine artery embolization.

MRI is particularly useful in preoperative planning and evaluation of candidates for minimally invasive procedures.

Conclusion

Uterine fibroids are common benign tumors with a wide range of imaging appearances. Ultrasound serves as the primary diagnostic modality, while MRI provides detailed characterization and localization. Accurate imaging classification assists in guiding appropriate clinical management.

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